



DEPARTMENT OF BOTANY

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LECTURE NO. : 12

DATE - 20th JULY, 2020

SUBSIDIARY PART - II

GROUP C - PLANT PHYSIOLOGY

DIFFUSION - II

In the process of photosynthesis in land plants, CO₂ from the atmosphere diffuses through the stomata and intercellular spaces of the mesophyll tissue. It then gets dissolved in the wet cell walls, and diffuses through the medium of solution towards the chloroplasts present in the palisade and spongy parenchyma where it takes part in the metabolism to form carbohydrate. As long as CO₂ is used up, a gradient of diminishing concentration is maintained and thus the process of diffusion will be continuous.

In the case of oxygen liberated during photosynthesis, the diffusion gradient is in the opposite direction, i.e., the dissolved O₂ diffuses away from the chloroplast surfaces and on reaching the wet cell walls, it will be liberated as a gas. The O₂ concentration in the intercellular spaces is higher than that in the outside atmosphere and, therefore, O₂ passes out through the

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stomatal apertures.

In the same manner, during respiration, exchange of gases between the living cells and the atmospheric air takes place through the stomata and the lenticels along decreasing concentration gradient of O_2 towards respiring surfaces in protoplasm, and of CO_2 away from these surfaces. Gaseous diffusion tends to equalise the concentration of gases (O_2 and CO_2) inside and outside the leaf but since the rate of photosynthesis is much greater (about 7 times) than the rate of respiration, the O_2 concentration in the intercellular spaces of green shoots is greater than the concentration of CO_2 outside. Similarly in the respiratory experiments when the rate of respiration is enhanced by raising the temperature, the CO_2 concentration in the internal atmosphere of the plant tissue is higher than that in the outside air.

During transpiration water evaporate from the wet cell walls of the turgid mesophyll cells and passes into unsaturated atmosphere of the intercellular spaces. From the intercellular spaces the water vapour diffuses into unsaturated outside atmosphere.

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